

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1.-28. (Cancelled)

29. (Currently Amended) A base station apparatus comprising:

a deciding section for deciding an allocation for a plurality of mobile stations within a communication area, by judging:

1) whether one of the plurality of mobile stations is a space-division-multiplex (SDM) compatible mobile station by use of a predetermined SDM evaluation criterion; and

2) whether another of the plurality of mobile stations is a space-division-multiple-access (SDMA) compatible mobile station to which a SDMA transmission can be applied along with the SDM compatible mobile station by use of a predetermined SDMA evaluation criterion;

wherein the SDM transmission evaluation criterion and the SDMA evaluation criterion are to be calculated depending upon a channel estimation value and received quality received from the SDM compatible mobile station and the SDMA mobile station within the communication area;

a partial-space orthogonalizing section for performing a weighting process, for enhancing orthogonality over a propagation path for the SDM transmission, on a first transmission data sequence to be sent by the SDM transmission to the SDM compatible mobile station;

a beam forming section for forming a plurality of transmission beams for an output of the partial-space orthogonalizing section in order to send the first transmission data sequence by the SDM transmission to the SDM compatible mobile station and a single transmission beam

for a second transmission data sequence to be sent by the SDMA transmission to the SDMA compatible mobile station; and

a plurality of antennas for transmitting the first transmission data sequence using the plurality of transmission beams and the second transmission data sequence using the single transmission beam,

wherein, in a case that the SDM compatible mobile station and a SDM incompatible mobile station are allocated for the SDMA communication at a same time, the beam forming section forms, for the SDM incompatible mobile station, a maximum ratio synthetic beam as a transmission beam to the SDM incompatible mobile station and forms, for the SDM compatible mobile station, another transmission beam as a beam for reducing an interference with another of the SDM incompatible mobile station and the SDM compatible mobile station to access simultaneously by use of a same frequency band.

30. (Currently Amended) A—The base station apparatus according to claim 29, wherein forming the transmission beam for reducing the interference by the beam forming section is to form the transmission beam from the transmission data sequence to the allocated SDMA compatible mobile station and an output of the partial-space orthogonalizing section, in a manner being orthogonal to a channel estimation matrix on another mobile station to access simultaneously.

31.-32 (Cancelled)

33. (Currently Amended) A—The base station apparatus according to claim 29, wherein, forming the transmission beam for reducing the interference by the beam forming section is to form the transmission beam orthogonal to a channel estimation matrix on another of a SDM incompatible mobile station and the SDM compatible mobile station to access simultaneously.

34. (Currently Amended) A—The base station apparatus according to claim 29, further comprising space-time coding means for making a space-time coding process on the transmission data sequence to the SDM compatible mobile station,

the transmission data sequence space-time-coded being outputted to the partial-space orthogonalizing section.

35.-41 (Cancelled)

42. (Previously Presented) A base station apparatus according to claim 29, wherein, in a case that the SDMA mobile stations include a SDM compatible mobile station and a SDM incompatible mobile station, another transmission beam to the SDM incompatible mobile station is formed by use of a complex-conjugate-transposition of a channel estimation matrix on the SDM incompatible mobile station, and the transmission beam to the SDM compatible mobile station is formed in a manner being orthogonal to a channel estimation matrix on another SDMA mobile stations to access simultaneously.

43. (Previously Presented) A base station apparatus according to claim 30, wherein, in a case that the SDMA mobile stations include a SDM compatible mobile station and a SDM incompatible mobile station, another transmission beam to the SDM incompatible mobile station is formed by use of a complex-conjugate-transposition of a channel estimation matrix on the SDM incompatible mobile station, and the transmission beam to the SDM compatible mobile station is formed in a manner being orthogonal to a channel estimation matrix on another SDMA mobile stations to access simultaneously.

44. (New) A base station apparatus comprising:

a beam forming section for forming a first transmission beam by use of a maximum ratio synthetic beam in order to send a first transmission data sequence for a SDM incompatible mobile station, the SDM incompatible mobile station being a terminal allocated for SDMA communication with a SDM compatible mobile station at the same time, the beam forming section for forming a second transmission beam in order to send a second transmission data sequence to the SDM compatible mobile station in a manner being orthogonal to the first transmission beam, the SDM compatible mobile station being a terminal allocated for SDM communication in a communication area of the base station, and

an antenna for transmitting the first transmission beam and the second transmission beam by use of a same frequency band at the same time.

45. (New) The base station according to claim 44, wherein the second transmission data sequence includes a plurality of third transmission data sequence by performing a weighting process and the plurality of third transmission data sequence have orthogonality.